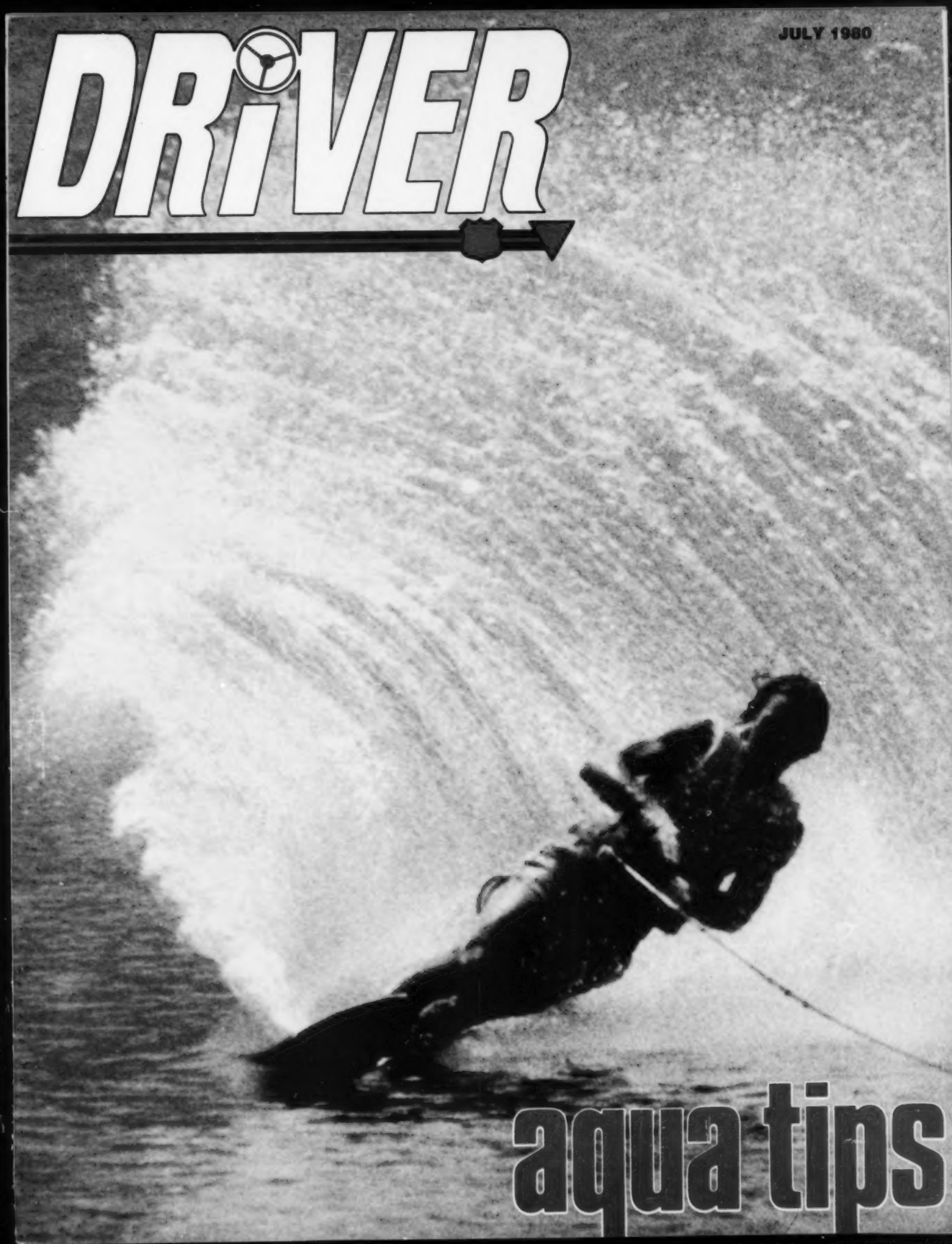
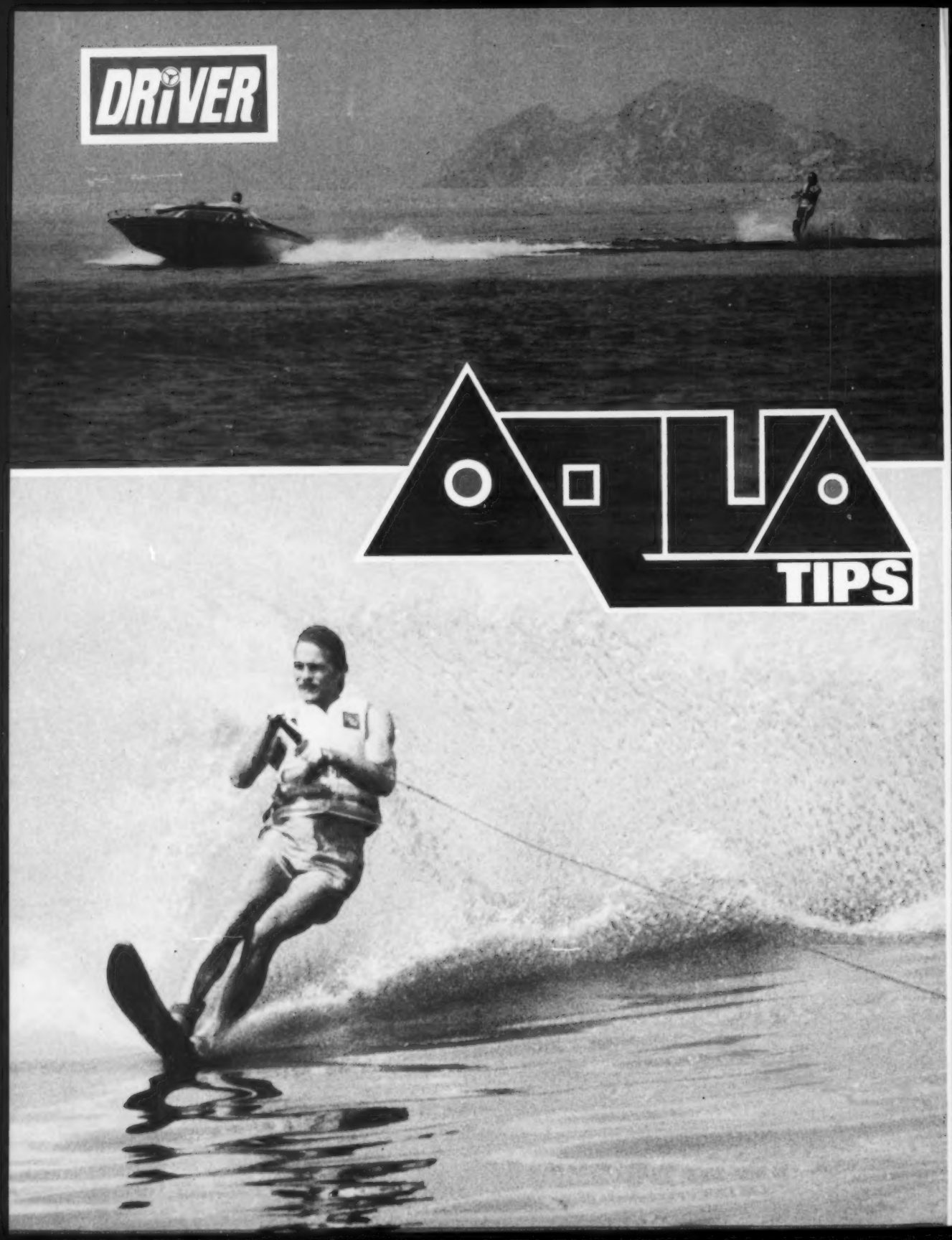
DRIVER

JULY 1980

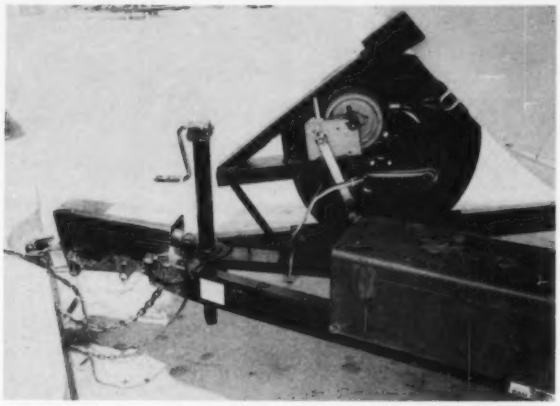


aqua tips


DRiVER
TIPS

Water is a natural place for fun, games and sports. It is also a place that demands respect for the rules of safety, because accidents and drownings are all too common. So when some friends went to local Lake Perris recently for a day of waterskiing, we went along to pick up some information to pass along to you. There is much more to know than we have room for here, so consult your local authorities, or the Coast Guard.

Have fun, whether you're in a boat, on skis, or in the water. But be careful too, okay? Be moderate with the beer. Don't indulge in too much heavy food, especially if you're going to be in cold water. Even if you're a strong swimmer, take care. It's easy to get in trouble your swimming skill can't get you out of. Drownings are the second highest cause of death among members of the Armed Forces. They usually occur in lakes, quarries, rivers and oceans, rarely in swimming pools. Boats are frequently involved.



(left) **Before they take off,** our friends always make sure the boat is securely hitched up, with safety chains in place. (right) **On the way** to the lake, they fill up the tank for the boat. There's no point in getting stuck at the middle of the lake out of gas. It's annoying, and embarrassing. While they're stopped they give the boat a thorough check.

At the lake, they stop long enough to check out a few other items before launching. The engine must be in the up position or it will drag on the launch ramp.

This sea cock, at the stern below the engine, must be tight before the boat is put into the water, or they'll find the decks awash. Its purpose is for emptying water from the bottom of the boat at the end of the day.

The driver slowly backs the rig down the launching ramp. Although one person never tries to handle the boat by himself, you should never let anyone ride on the trailer, as one person is doing here.

continued

THE EDITOR SPEAKS DOUBLE CLUTCH

THEN AND NOW

Sometimes we use this column to report on government rulings that could lead to significant changes in the vehicles of the future. It's interesting to look back at old columns and see if things actually turned out as predicted.

For instance, in December 1977 this column reported that the Environmental Protection Agency (EPA) had just discovered two-thirds of all 1975 model cars failed to meet their emission standards by the time they were 12 to 18 months old. EPA figured the cars had been tuned out of the clean-air parameters and so proposed a rule that by 1980 new cars would have to pass emission testing with the engine adjusted to any setting within the adjustability range of its carburetor, fuel injector and ignition system. This of course forced the manufacturers to limit adjustability to such an extent as to make it a futile exercise to try to tune the engine any better.

Now it's mid-1980 and we find that the EPA not only did what they proposed three years ago but are getting even tougher about adjusting the carburetor. The Agency calls it "tampering" and they now have announced carbs are to be in the absolutely-hands-off category. As the Agency engineers evaluate 1982 model anti-tampering mechanisms they will use an electric drill and chisel if they think the future car owner might try the same thing. If a carb is designed with a casting that looks tempting to drill through or chisel off and if EPA thinks it can be done without damaging the carburetor, they'll drill and chisel. Then if they can adjust air or fuel flow, they'll flunk the carb.

The message from EPA to manufacturers is plain: Don't tempt the backyard mechanic!

Next month we'll review some old columns about proposed air bag and passive restraint rules and compare them to what is actually happening today.

JUL

VOLUME 14 NUMBER 2

CONTENTS

Features

Aqua Tips **1**

Human Powered Events **8**

An Open Letter for All Motorcyclists **13**

Riverside IMSA **14**

Humor **29**

DRIVER Rhymes **Back Cover**

Departments

Double Clutch **2**

Double Tech **20**

The Backyard Mechanic **22**

Backfire **28**

COL. WARREN L. BUSCH
Chief, Safety Education Division

VIRGINIA HENDRIX
Editor

TSgt RON LATHROP
Technical Editor

JERI ROOD
Feature Editor

ALICE MILKEY
Editorial Assistant

DON KELLEHER
Art Director

LORRAINE HAMBLEN
Staff Artist

CLIFF MUNKACSY
Staff Photographer

Next they disconnect the boat's rear tie-down chains and wrap them around the trailer frame to get them out of the way.

The driver backs until the boat is afloat and the trailer is submerged. A boat trailer should not be submerged unless it has waterproof bearings and caps on the wheels.

Then, they carefully winch the boat the rest of the way into the water and disconnect the cables.

The driver waits until the boat is safely away from the trailer.

And he drives it away to park until the end of the day's activities.

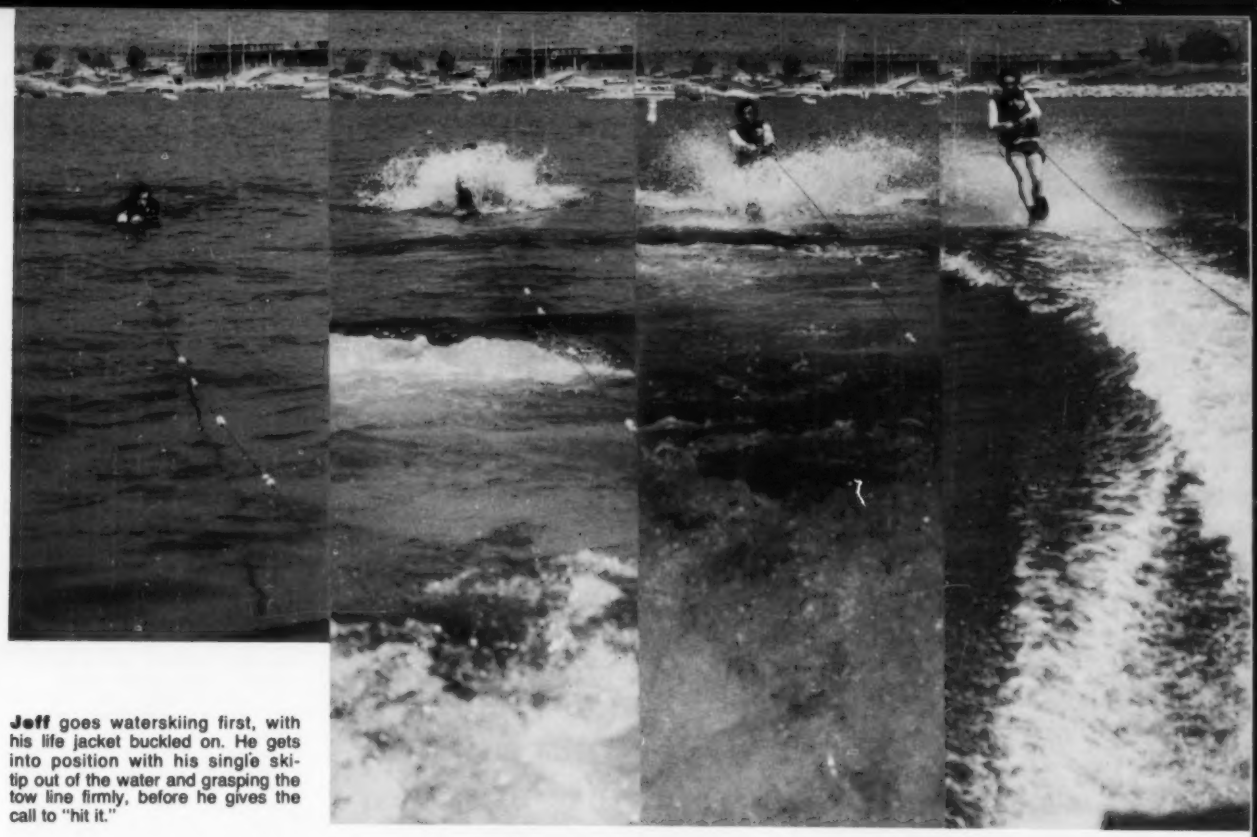
continued

(left) **On board,** the "skipper," Greg, verifies that the safety equipment, including life jackets and first aid kit, is easily accessible. (middle) **By law,** there must be one life jacket (the Coast Guard calls them "wearable personal flotation devices") for each occupant of the boat. They need not be worn, but they must be readily available. Non-swimmers and small children, however, should wear them at all times.
(right) **Also,** there must be a fire extinguisher of an approved size and type on board. (Check with your local authorities.)

Not required is this CB radio, but Greg finds it handy at times.

(left) **Even though** this boat is larger than the small outboards, it's a good idea for the occupants to be evenly balanced to keep the boat stable. So Kurt sits on the port side, facing aft. (middle) **And Jeff** sits on starboard. They also serve as observers when they're not skiing. (right) **Greg's rearview mirror** doesn't count for observation purposes. He's got all he can handle piloting the boat. There must always be *at least* three people involved in waterskiing—the boat skipper, the skier, and the observer.

Any time someone is in the water, he should wear a life jacket, whether he's a poor swimmer or not. Also, the engine should be off when the boat is stopped, both for safety and for conserving gas.



Jeff goes waterskiing first, with his life jacket buckled on. He gets into position with his single ski-tip out of the water and grasping the tow line firmly, before he gives the call to "hit it."

Jeff is in a good position, body and arms straight, leaning back.

If he leans forward like this for too long, he will get tired more quickly.

continued

Kurt shows a few of the main hand signals the water-skier uses to signal the boat. One thumb up means "more speed."

A thumb and forefinger forming an "O" means "speed okay."

One thumb down means "slow down." If the skier is controlling the direction of travel (which he wasn't in this group) he points to the way he wants to go.

A hand making a cutting motion under the chin means "cut engine." One palm held out toward the boat means "stop."

If the skier takes a plunge, the observer must raise a red flag to signal other boats that there's a person in the water nearby. The skier should raise clasped hands to signal his own boat he's okay.

Boaters must be careful when cruising near other boats, especially when one or both are pulling skiers. *Never* try to pass between a boat and its skier.

Greg, the most experienced skier of the group, jumps the boat's wake. Stunts like this are for that type of skier—the experienced one.

Likewise, this one is for experts. Kay tries to get on Greg's shoulders.

But she signals the boat to slow down when she realizes they're not going to make it.

This knee board is just what it sounds like. The skier rides it on his knees, with a strap across his legs to hold him on. The technique is somewhat different than with skis, and the skier can't go as fast.

Greg performs a steep cut. Need we say the "experience" remark again?

"The Guy at the Gas Pump is on the Bottom of the OPECking Order."

"Old Fish and High-Priced Transportation Stink."

HUMAN POWERED EVENTS

The year is 2000. The air over Los Angeles is clear. Although the population of this megatropolis has continued to outstrip the rest of the nation, the traffic jams of the mid-20th century are no more. What were once eight-lane highways now feed 24 lanes of traffic in and out of the city daily. Furthermore, commuters are no longer obese chain smokers, but as physically fit as marathon runners. They have to be. They provide their own power to and from work.

Who knows? By 2000, we may want to declare our independence from automobiles. These motorized things are getting too expensive to own and to run, and the regulations are making them more and more difficult to work on. The more complex and costly they get, the less likely we are to want them very much longer.

What's the alternative, though? Walking? Going back to horsepower? No. Let's think about *human* power, and the latest thing in bicycle-type transportation.

We're not talking about your old bike with the coaster brakes that could get you up to 20 mph going downhill with a tailwind. We're talking about futuristic-shaped vehicles capable of speeds equal to – and above – the national speed limit of 55 mph. Yep, you heard right.

Recently several human-powered vehicles exceeded that mark at the Ontario Motor Speedway in California at the Sixth Annual International Human Powered Speed Championships.

The meet is run by the International Human Powered Vehicle Association, the same group that sponsored the attempts at human-powered flight across the English Channel last year. In fact, one of the entrants in some of the events at Ontario was Bryan Allen, the man who made the successful Channel hop.

"If Transportation Was Meant To Cost So Much, Why Were We Born With Feet?"

"There's No Fuel Like The Old Fuel."

"Poor As A Churchmouse With A 30 Gallon Gas Tank."

Entrants from around the country pumped their machines down the front straightaway on Ontario's 2½ mile oval to try to break the speed limit on a 200 meter stretch. Several of them succeeded.

The vehicles they rode were a varied group of egg-and-cigar-shaped constructions, as well as standard racing bicycles with fairings, and even a wheelchair operated by a hand crank. They represented a variety of efforts, with designs by individuals, colleges, and even an independent cooperative group of designers.

The events at the two-day meet included the 200-meter speed trials, a 27-mile road race, and a one-hour race. The 27-miler was originally scheduled as a 30 kilometer race, but the IHPVA officials decided to lengthen it, because of the high speeds that the vehicles were reaching in the speed events.

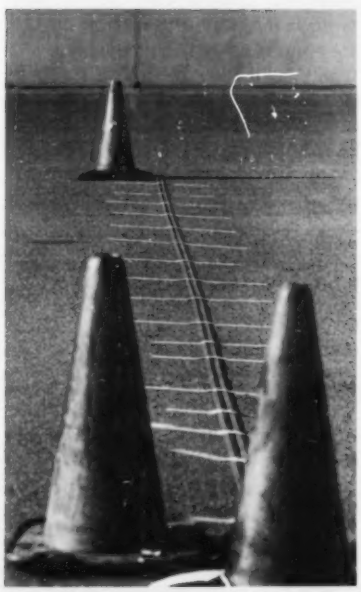
And they were impressive speeds. The fastest speed for a two-man vehicle was 62.92 mph. Second place was 61.04, and third was 56.70 mph, all of which would be illegal on the nation's highways. The single-man vehicles attained speeds of 56.66 mph, 55.92, 54.69, 50.04 . . . Obviously, it would be a disservice to belittle these contraptions.

The stars of the Championships were plainly the team who designed and manned the vehicles called "Vectors." These two vehicles, shaped like elongated eggs, won all but one of the events at the Ontario meet. Imagine a tricycle-like arrangement with two steerable wheels in front and one trailing wheel, enclosed in a plastic Easter egg, and you've got a rough idea.

But these were nothing to laugh at. These were the vehicles that reached the speeds of 56.66 mph, and 62.92 mph, respectable speeds that we're not sure some of today's economy cars could match.

The records on the other events

continued



The timing system for the 200-meter trials was simple—entrants rode across wires which started a timer and went across wires at the end of the run that stopped it.

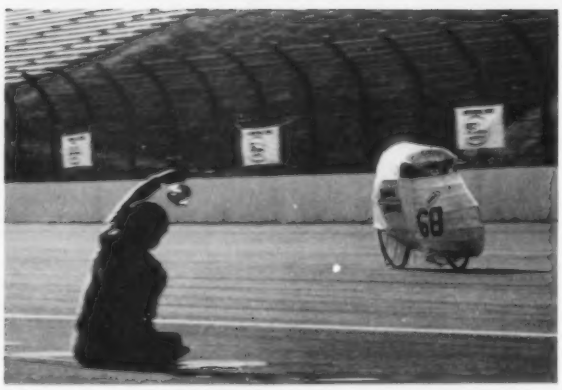
were impressive also. On the one-hour distance race, the multiple-rider winner, again a "Vector," went over 46 miles. The single-rider winner (also a Vector) went just short of 37 miles.

For the 27-mile race, the Vector two-man vehicle finished in 53:06, for a sustained speed of 30.5 mph. The single-rider winner was Fred Tatch, the star of the 1979 Human Powered Vehicle Speed Championships, with a time of 54:52 (29.5 mph).

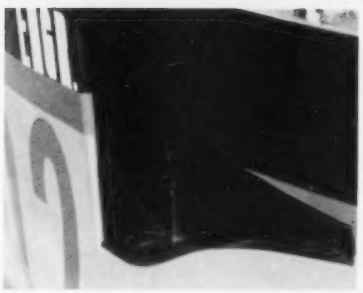
The IHPVA announced a human powered race that will be held in Brighton, England on September 6, 1980. Any of you readers stationed over there should make a note to attend. Judging from the Ontario show, we think you'll have an interesting time.

(right, below) **The 27-mile road race** had a LeMans-style start. But with the preparation a lot of the vehicles required, it wasn't quite as *fast* as LeMans.

At the timing table, the time was converted into a miles-per-hour score and reported to the announcer, Peter Boor, president of the International Human Powered Vehicle Association.

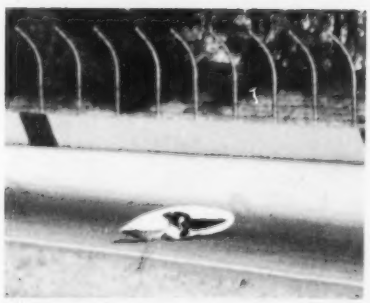


Wind was an important factor, especially in the speed trials. Officials constantly tested the wind speed to determine when it became too strong. By 11:00 a.m. each day, the speed runs had to be halted.



Air circulation was a problem in the enclosed vehicles. Some incorporated such innovations as this computer-designed airscoop.

For the 27-mile road race, the riders of the "Chain Reaction" vehicle solved the heat problem by removing the plastic windshields, cutting a larger hole in the nose of the vehicle . . .



The speed runs weren't without their dangers. Several vehicles spilled over, but the only injuries were scrapes and bruises.

(right)
The well-equipped "Vector" team had a fan to keep the rider cool while he was waiting for the go-ahead for his speed run.

continued

human powered events

continued

(above)
And having people douse them with water on every run past the finish line.

(far left)
Bryan Allen, one of the entrants to the events, was the man who flew the human-powered "Gossamer Albatross" across the English Channel last year.

(near left)
For safety reasons, every entrant to every event had to wear an approved bicycle helmet. Bell Helmets sponsored the Championships.

Many of the shells of the vehicles had to be taped shut.

Some of the riders got other help.

an open letter for all Motorcyclists

New or Experienced

To Whom It May Concern

This letter is to introduce you to An Experienced Motorcyclist.

An Experienced Motorcycylist has been riding two-wheeled vehicles in traffic for several years. He (she) learned long ago that the only similarity between driving a car and a motorcycle was that they both use the same road. Therefore, An E. Motorcyclist knows that a person can't hop on a bike and go full bore the first time out. As a result, An E. Motorcyclist knows the new rider needs to have someone to be a "Big Brother or Sister" for him or her during the first crucial thousand miles. This doesn't mean sitting on the new rider's back, but it does mean getting him or her off in the right direction and with the right outlook.

It's a little late (but not too late) to start when the new bike is already in the parking lot. By that time the new owner has the itch. An E. Motorcyclist can spot it by the convulsive flexing of the new rider's left fingers and unconscious rotation of his or her right hand when the mind isn't on the job at hand.

An E. Motorcyclist knows the best time to start is when the new rider is looking at other bikes in the parking lot and asking very pointed and searching questions such as "How much?" "Easy to handle?" and "Do you like high risers or stock?" The new rider is hooked, so An E. Motorcyclist plays him or her right and has a long-time riding partner. An E. Motorcyclist knows that brushing off or overplaying the new rider will set that new rider up for a fall – a hard fall.

The new rider wants to find out from An E. Motorcyclist if it's as great as it looks. An E. Motorcyclist feeds him or her straight talk about safe wheel track, visibility, weather sense, balance. An E. Motorcyclist puts the new rider on the buddy seat and shows him or her how it feels. Shows him or her smooth professional handling. Talks helmets, clothing, defensive driving, courtesy and (to be honest) emergency tactics. An E. Motorcyclist puts the bad mouth on "tunneling," "pumping" at stop signs, "squirreling" in heavy traffic, and all those things that make automobile drivers hate two-wheelers.

An E. Motorcyclist shows an interest in the new rider's interest: what size bike; what extras; street; dirt; cross-country; and so on. An E. Motorcyclist introduces the new rider to other bikers and talks up the good life. *It is a great way to travel for those who go by the rules.*

When the day comes for the new rider to pick up his or her bike, An E. Motorcyclist goes along. The new rider enjoys and appreciates an "old hand" to ride with in that first dice with traffic. An E. Motorcyclist encourages the new rider, points him or her in the right direction, teaches him or her to stay alive without standing in the way.

Even if An E. Motorcyclist didn't get to the new rider early, the green rider isn't really lost. Everybody wants to belong and people on motorcycles have got more "belonging" going for them than people in the four-wheel crowd. Two people on bikes, even in heavy traffic and going in opposite directions, can usually manage to exchange some kind of greeting. Watch. You'll see it all the time. So the novice wants to belong, too. So An E. Motorcyclist gives the new rider the best possible example, knowing that "imitation is the highest form of flattery."

An E. Motorcyclist helps the new rider understand that being "in" means being sensible, mature and responsible, because there's something in it for everybody. Any rider who is selfish, discourteous, intimidating or lawless sets a picture in the mind of auto drivers that is recalled every time they see two wheels, no matter who is riding them. All motorcycle operators get framed this way.

So An E. Motorcyclist, with miles and years of happy cycling under his/her boots, takes the new rider and shows him/her the right way. An E. Motorcyclist helps the novice find the same excitement that he/she has felt. Gives the green operator something more than "450 feet into a parked car" to remember as the high point of motorcycling.

An E. Motorcyclist is a "Big Brother/Sister" to fellow bikers. Give An E. Motorcyclist the chance and A.E.M. will do the job.

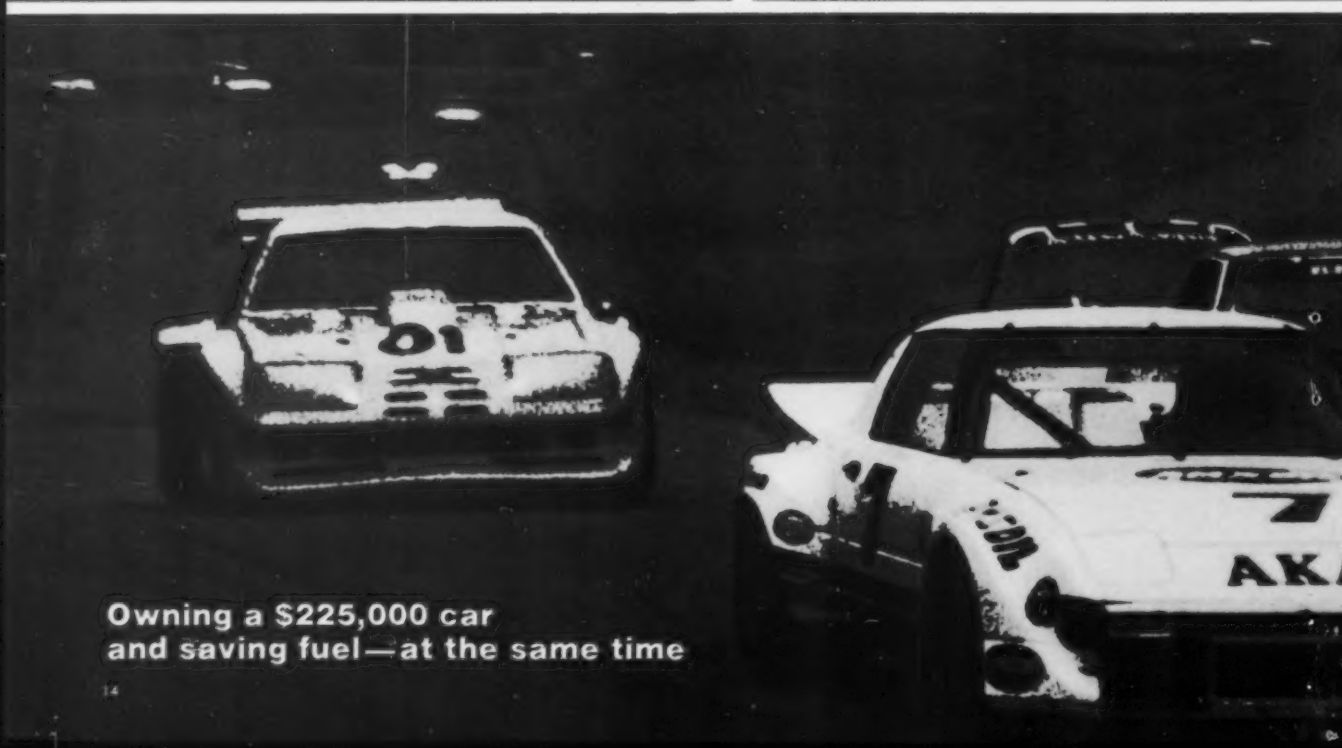
RIVERSIDE IMSA

Imagine for a moment that you are Dick Barbour. You own a Datsun dealership less than 10 miles from Disneyland, a Honda car dealership in Phoenix, a Ferrari dealership in San Diego and . . . And Dick Barbour Racing, Mountain View, Calif. Besides these assets, you are in your own right a professional racing driver.

During the last two years you have co-driven Porsche 935s to second and fifth in the 24 Hours of Endurance at Le Mans, first and fourth at the Sebring 12-hour race, second at the Watkins Glen 6-hour event and fifth in the Daytona 24-hour race. You've shared driving chores with the likes of Rolf Stommelen, Brian Redman, Rick Mears and P. L. Newman (Paul to you moviegoers). The driving points you've earned have taken you to second and seventh place in the World Challenge for Endurance Drivers.

This year's win at Sebring was the second straight for cars you own. At last year's Le Mans you entered four Porsche 935s that cost more than $125,000 apiece and represented 16 percent of the United States' 935 population.

Now you—as Dick Barbour—enter two cars in the Los Angeles Times/ Toyota Grand Prix of Endurance at



Owning a $225,000 car and saving fuel—at the same time

Riverside International Raceway, Calif. Your newest car is reported to have cost between $200,000 and $225,000 (depending on the value of the Deutsche Mark). The second vehicle is two years old but has been updated to the newer model's standards. Total cost of the two cars: $410,000. And that's not including spares such as engines, transaxles, body panels and wheels. Also not included in that figure are racing tires, tools, crew salaries or the Peterbilt tractor and trailer that hauls everything.

To help ensure that you have a winning season you've hired Englishman John Fitzpatrick as your co-driver for the entire season. His past record includes winning: the 1972 and 1974 International Porsche Cup; 1976 Daytona 24-hour race; 1977 Hockenheim, Germany, 6-hour race; and World Championship of Makes races in 1979 at Maugello, Italy; Silverstone, England; and Nurburgring, Germany. In fact, Fitzpatrick is referred to by your chief rival, 1979 World Challenge for Endurance Drivers Champion, Don Wittington, as the "number one Porsche driver in the U.S. right now."

Keep in mind Dick Barbour's investment and background in racing. Now think of something to say when the race organizers tell you that these three-mpg racing cars are going to have to use 17 percent less gasoline than they did in last year's Riverside endurance race.

Do you laugh in their faces? No. Do you tell them that *you* can afford to use as much gas as you want? No. No, because they have developed a plan whereby everybody will use that much less fuel. They cut the race length from six to five hours.

Traditionally, endurance races run at least six hours or 1,000 kilometers. (For you hard-line milers, 1,000 kilometers is about 621 miles.) There are, or have been, 24-hour races at Daytona, Spa-Francorchamps and Le Mans; 12-hour events at Sebring and Rheims; 6- and sometimes 9-hour races at Watkins Glen, Brands Hatch and Goodwood; a 1,000-mile tour of Italy called the Mille Miglia; and 1,000-kilometer events such as Targa Florio and Nurburgring. In the past, endurance events have had the habit of growing longer, not shorter. But Riverside reversed that trend to take the lead in demonstrating fuel conversation.

There were further fuel savings at the Riverside race. Instead of setting aside the better part of a week for practice, there were only four 45-minute practice sessions spread over Thursday and Friday. There was also a single 20-minute qualifying shot Friday for the first 40 starting positions. The remaining 32 entrants had to run a 10-lap race Friday afternoon to see who would get invited to fill anywhere from 10 to 20 more positions on Sunday's grid.

As you can see, even those people who can afford to buy fuel at any cost are making an effort to share evenly in cutbacks.

With practice and qualifying Thursday and Friday, and the race on Sunday, what happened on Saturday? That day was set aside for seven historical sports car races. Out of 126 entries, 96 historical vehicles actually started races. Winning vehicles included: 1927 Bugatti T-37A, 1952 Allard J2X, 1959 Sebring Sprite, 1962 Lotus 7, 1965 Shelby GT350, 1958 Lister-Chevrolet and 1972 McLaren M-20. Single fastest laps ranged from 66.240 mph for the Bugatti to 111.004 mph for the McLaren Can-Am vehicle.

Sunday there were two supporting races to keep the crowd of 39,500 entertained before the 1 p.m. start of the five-hour grind.

The first supporting race was a 31-lap Champion Spark Plug Challenge

continued

Lap one, Turn Seven finds Don Whittington leading John Fitzpatrick.

The battle for GTU honrs was hot and heavy all afternoon with the winner decided with less than 10 minutes left in the five-hour race.

for Radial Sedans. RS is just one of five classes of cars raced in the International Motor Sports Association. While the five-hour race was part of the World Challenge for Endurance Drivers, it was also part of IMSA's 14-race Grand Touring series this year. IMSA GT racing is broken into three categories: GTX (experimental), GTO (over 2.5 liters engine displacement) and GTU (under 2.5 liters). IMSA's other class is the Kellygirl American Challenge for medium-size American sedans, although ACs didn't compete at Riverside.

Fast qualifier and RS series point leader Jim Downing gunned his Mazda RX-3 into the lead at the start. But on the second lap, Dennis Shaw in an AMC Spirit took the lead from Downing going into Turn Nine at the end of Riverside's 1.1-mile backstraight. Using traffic to his advantage, Shaw was never displaced from the lead. Fifth starting Rob McFarlin in a Datsun 200SX grabbed fourth at the green flag. He then passed Downing for third at Turn Two on lap five and took second from Roger Mandeville's Mazda RX-3 in Turn Nine on lap eight. At the finish it was Shaw, McFarlin, Mandeville and Downing followed by another Mazda, Renault Le Car, Spirit, Mazda and Volvo 142E all on the same lap.

RS races usually involve more push and shove. For example, Shaw was driving his team's back-up car having written off his regular mount in the rain at Road Atlanta two weeks before Riverside. Last year McFarlin had been leading Shaw's teammate Amos Johnson on lap two when Johnson used McFarlin's car for additional braking at the end of the long River-

side straight. The end result for McFarlin was being out of the race with a broken wheel and radiator damage, while Johnson hung on to finish fifth on tires that had been horribly flat-spotted while spinning.

But tires are what make RS racing so close. Cars must run on approved street-legal radial tires. If it's dry they use 60-series radials; when it's raining they use 70-series radials.

The second supporting event was a pro/celebrity show in Toyota Celicas. The finishing order of the 10-lap dem-

The race winning Porsche 935 of Barbour/Fitzpatrick exits Turn Six with its lights aglow as a warning to slower traffic.

This is a Toyota Celica as modified under Group 5 racing rules.

onstration was: Rick Mears, Don Whittington, Dan Gurney, Parnelli Jones, Pete Conrad, Gene Hackman, James Brolin, Warner Hodgdon and Bruce Jenner.

With the supporting events out of the way, Dick Barbour's $410,000 investment went to the line with 58 other hopefuls. But even for a man of Barbour's stature, the huge investment in cars didn't guarantee a victory in the five-hour race.

To insure Barbour's team didn't have an easy time of it, the 1979 Le Mans-winning Whittington brothers had brought three Porsche 935s to Riverside. Don and Bill used two cars for qualifying, selecting the best one to share in the race. The third was entered for two 20-year-old drivers. One was their younger brother Dale, while the other was Michael Chandler, son of Los Angeles *Times'* publisher, Otis Chandler.

Don and Bill branded their intentions of repeating last year's Times Grand Prix of Endurance victory in the record book by setting a new qualifying record. They toured the 3.3-mile, nine-turn road course in 1 minute 39.296 seconds at an average speed of 119.642 mph. That was almost two mph faster than last year's qualifying record.

While this was only 0.087 second faster than Fitzpatrick toured Barbour's newest vehicle around the southern California course, it did give the Whittingtons and the Fitzpatrick-Barbour cars a full second per lap on the next fastest vehicles.

When the field rolled out for the start of the race there were five solid rows of Porsche 935s, two-to-the-row. In the sixth row was a lone Monza and another 935. Then there was another double row of 935s before the Dome Celica Turbo and March-Chevrolet of row eight. Row nine was made up to a BMW M-1 and Corvette.

Row 10 had the first of the GTO field with one of the three Corvettes and one of the eight Porsche Carreras filling its width. The other GTO cars (that included a Camaro, one Porsche 934, one Datsun 280Z, three Porsche 911s, a Triumph TR-8 and a single Ferrari Daytona) were intermixed with the GTU cars. The fastest GTU, one of the six Mazda RX-7s on hand, was in the 11th row. Racing against the loud rotary-engine Mazdas were four Datsun Zs, seven Porsche 911s, two Porsche 914-6s, one Porsche 914-4, a Datsun 200SX and a Lancia Stratos. Sharing the 30th row with one of the GTU 911s was another Monza which had blown an engine Friday.

When the green flag fell, the serious race for first overall lasted only a couple of laps. Fitzpatrick explained the entire race that evening while flourishing a gallon of milk as if he were the Indianapolis 500 winner.

"After the first lap today I tucked right up behind (Don) Whittington and I think I made him nervous," Fitzpatrick explained. "I think he thought I might pull a trick like they did on me but I'd never do anything unsafe like that." The Englishman was referring to an incident two weeks before at Road Atlanta when Bill Whittington and he tangled cars, putting Fitzpatrick out of the race that Bill went on to win.

"He slowed down for a car and when his turbocharger lost its boost I blew by him," Fitzpatrick continued. "A bit later I looked in my mirrors and saw him spin and can't say it felt too badly.

"I only touched our boost control once," noted Fitzpatrick, talking about the knob that allows the driver to adjust the amount of pressure supplied to the engine by the turbocharger. "I had it up pretty high for the first lap because we wanted to get away from the traffic. I turned it down then and for the rest of the race I ran flat out with that boost pressure. Even when

continued

The GTU winning Mazda RX-7 of Brad Frisselle/Yoshimi Katayama stops in the pits at mid-race for fuel, a driver change and tire check.

riverside IMSA

continued

we were three or four laps ahead I never backed off."

"We wanted to intimidate the other fast drivers so they would turn up the boost trying to keep up with Fitz and drop out," Barbour added. "We really didn't want them out there with us. It looked like our plan worked, didn't it?"

It sure did.

After Don Whittington spun at Turn Seven on lap 18 without losing second place, he dropped far behind the fleeing Fitzpatrick. Then on lap 29 the Whittington Porsche ran out of gas and coasted to stop inside Turn Nine only about a 1,000 feet from the pits. Don sprinted to the pits, got a five-gallon can of gasoline, returned to the car and drove to the pits for a normal fuel stop. That episode cost Don and Bill four laps. Then on the leader's 47th lap, Bill Whittington brought the 935 back to the pits in what was to be a long series of stops that include a minor fire, replacing both turbochargers and replacing some plug wires. Don and Bill Whittington finally gave up driving the car with less than 10 minutes to go before the end of the race.

Fitzpatrick said, "The car ran perfectly. I changed the car after qualifying it so it would go faster down the long straightaways and go slower through the turns. You can pass a lot of cars on the straight and in the corners it gets so tight it's hard to pass even a slow car so I made the change."

Now don't get the idea that the Barbour/Fitzpatrick Porsche 935 was much slower per lap after the changes. On lap three when Fitzpatrick flew past Whittington he set the fastest lap time of the race at 1:41.23 or 117.357 mph.

Although Barbour's older Porsche 935 doesn't look much different from the newer Kremer K-3 model, it is not as fast.

That's less than two seconds slower than he qualified, yet the car still had most of its 34-gallon tank full of gasoline.

There were a few minutes just after the third hour of the event began when the Barbour team looked like they might have trouble. On lap 69, Barbour spun in some oil at Turn Eight.

"I had just passed the 55 car and was in fourth gear and had just taken my foot off the throttle to slow down," related Barbour, "when I looked up and saw oil flags in the air. It was too late. I started to slide and my only concern was to keep the car on the asphalt. I didn't want to get out in the dirt because our car is so low it could have damaged the spoilers so I slid straight. I sat there because I didn't want to turn in front of the traffic."

He sat there for about a minute and a half. "I didn't want to do something stupid and pull out in front of some banzai chargers."

Even with this adventure, Barbour/Fitzpatrick covered 165 laps or 544.5 miles in the five hours for an average speed of 108.397 mph.

All the non-Porsche GTX cars and half the 935s ground to a halt trying to keep the pace that found the Barbour-Fitzpatrick Porsche lapping the entire field by lap 47. Two 935s lost engines, one after only 19 laps, the other after 95. Oil pressure disappeared in another 935 after 27 laps, while the clutch let another of the special Porsches down after 54 laps. And another of the extra-special, $200,000-plus models similar to Barbour's and Whittington's broke its rear suspension while being driven to the pits on a flat tire during lap 60.

The best performance by a non-Porsche came from the 30th row of the grid. That Monza charged up to 16th place by lap four and had gotten into eighth place at the end of the first hour. However, there were problems with the on-board jacks during pit stops and the transmission finally failed after 82 laps.

In GTO, the lone Porsche 934 had the initial lead but was dumped to third during the second hour by a battle between the Tony Garcia/Terry Herman Porsche Carerra and the Bob Tullius/Bill Adam Triumph TR-8. The

---

Answering that question is about as easy as telling people what a sports car is. Anybody who can do either—and have anybody understand the explanation—should be a politician.

GT is Grand Touring. That's simple enough. But what is Grand Touring? Basically it is two intimate friends going from point A to point B in style and comfort, safely and quickly. Driving your econobox to the corner convenience store for a package of smokes doesn't make the grade.

For example, you and your companion are going to the Monterey Historic Automobile Races at Laguna Seca Raceway Aug. 23 and staying over for the Pebble Beach Concours d'Elegence on Sunday. You'll want to be fresh for Saturday's races, so you'll be doing the eight-hour drive from Los Angeles Friday. And rather than press your schedule, you'll also take Monday off to drive back.

You'll want your car to be able to hold both of you very comfortably while providing an intimate environment. The trunk must be able to handle the weekend's luggage. In addition, the car will have to handle well enough—this includes not only cornering smoothly with little body lean, but excellent braking action and ease of acceleration—to negotiate

John Morton limps Howard Meister's Porsche 935 (the white car on the right) to the pits after the right rear tire went flat on the backstraight.

After Don Whittington ran out of gas at this point in Turn Nine earlier in the race, brother Bill heads for the pits smoking heavily from a turbocharger failure.

With the Porsche 935K3 suspended by its own onboard jacks, Don and Bill Whittington exchange the driver's seat as the crew changes the left rear tire. The flames coming from the exhaust are signs of more turbo problems for the 1979 Le Mans winning brothers.

war was settled in favor of Garcia/Herman when the TR-8 spent 25 laps in the pits changing the transmission.

The GTU class looked like a runaway for the Don Devendorf/Tony Adamowicz Datsun ZX until just after the four-hour point. Having already traveled more than 360 miles the ZX's engine blew. Another ZX in the hands of Frank Carney and Dick Davenport was in the wings ready to uphold Datsun's honors.

Trailing the Carney/Davenport team by 40 seconds with an hour of racing left was Brad Frisselle. He was driving his brand new Mazda RX-7 that he had shared during the day with Japan's Yoshimi Katayama. Frisselle began to reel in the Datsun. With only 10 minutes left in the race, the Datsun got caught in traffic on the 1.1-mile back straightaway.

"I jumped all over him," Frisselle exclaimed, "going into Turn Nine way over my head because I just didn't want to wait around with the suspense any longer."

Frisselle/Katayama drove 148 laps in the five hours to finish ninth overall, several seconds ahead of the Carney/Davenport team. The GTO winning team of Garcia/Herman covered 151 laps for eighth overall honors.

All the surviving Porsche 935s filled the positions in front of Garcia/Herman. From seventh to second were: Charlie Mendez/Brian Redman, 155 laps; Randolph Townsend/Bruce Jenner, 158; Dale Whittington/Michael Chandler, 160; Bob Akin/Roy Woods/Ralph Kent Cooke, 161; Bruce Leven/Hurley Haywood, 161; and Barbour's second car driven by Bob Garretson and Bobby Rahal, 162.

At the end of the five hours, half the 60-car field was still running, although a few of them had spent more time stationary on pit road than navigating the asphalt ribbon in the southern California desert. Barbour and Fitzpatrick were just as happy to have won a five-hour race as they would have been to win a six-hour race. As for the spectators, they probably didn't miss the extra hour. Besides, since it was the first day of Daylight Savings Time, it was perfectly natural to lose an hour.

California's famous and beautiful Pacific Coast Highway, Route 1.

Most of all, the car should look like it belongs. Like it belongs on the Pacific Coast Highway. Belongs at the races. Belongs at a Concours d'Elegence. And is at home at Pebble Beach and in Monterey. Since you'll be staying at a luxury motel and eating in some of the fancier places, the car mustn't cause people to turn away when you pull up at the curb. After all, your friend is to be treated to the best.

That's what Grand Touring is. And that's what Ferrari, Maserati, Porsche, Jaguar, Aston-Martin, Alfa-Romeo, Lotus and others have built their traditions on. And that's one of the markets that Datsun, Mazda and the more adventurous American manufacturers are targeting.

But mostly Grand Touring is a self-image. If your vehicle is performing well and the company is exceptional, it is *Grand* Touring.

As you'll recall, one of the things that makes a GT a GT is how it handles. It is therefore easy to understand why these vehicles are excellent starting points for building racing machines. Starting points, because GT racing cars only resemble their origin. Many parts are beefed up to handle racing speeds and strains, while the entire passenger compartment and beyond are reinforced to protect the driver in case of an accident.

To detail each of the common GT racing classes takes volumes, so DRIVER won't bother. But if GT racing interests you, watch local advertising for either the Sports Car Club of America's Trans-Am or IMSA events.

tteecch!h DOUBLE TECH Q A

My wife and children bug me about how I shift my little economy car. They say I get the engine going too fast before shifting. I say it's better to rev up the engine than to let it lug down. When should I shift into second, third and fourth gears? Should I gear down for stop signs?

Engines and transmissions vary from vehicle to vehicle, and these factors combined with the vehicle's weight determine shifting speeds. Therefore, there is no rule on when to shift that would apply to all cars. It is through experience that drivers learn about their cars and can tell from the sound of the engine when it's time to shift.

Revving an engine too fast can literally blow the engine's moving parts in every direction. Even if the engine isn't exploded, high-speed operation can wear it out faster than normal.

Meanwhile, there are two schools of thought about lugging. The "old" school says that during lugging the engine is fed more fuel than it can use, and the improper combustion—often heard as "pinging" sound—can lead to broken piston rings, overheating and a number of other problems. Now engineers of the "new" school tell us that we should love "ping" because it indicates the engine is operating at maximum fuel efficiency and "will not damage most car engines." (See "Learning to Love the Ping," July '79 DRIVER.)

Choose your school and take your medicine.

As to the specifics of your question, some owner's manuals list "Maximum downshift points" and "Minimum upshifting points" while other manuals provide gear range charts.

You can use the maximum downshift points from a higher gear to a lower gear as the maximum upshift points from the lower gear to the higher one. The minumum upshifting points should be self-explanatory. Gear range charts show the slowest and fastest for each gear.

For example, the manual may list:

Maximum downshift points:

4th to 3rd	85 mph
3rd to 2nd	56 mph
2nd to 1st	32 mph

Minimum upshifting points:

1st to 2nd	20 mph
2nd to 3rd	32 mph
3rd to 4th	40 mph

In a manual reflecting gear range charts, the same information would look like this:

1st	0 to 32 mph
2nd	20 to 56 mph
3rd	32 to 85 mph
4th	40 to 115 mph

Therefore, the fastest you should go in each gear is:

1st:	32 mph
2nd:	55 mph
3rd:	55 mph
4th:	55 mph

No, I'm not playing games. Don't exceed the nationally posted speed limit in any gear.

What is more important is the minimum speed at which you can change into the next higher gear. I'll explain why shortly.

The minimum speed for each gear on this vehicle is:

1st	0
2nd	20 mph
3rd	32 mph
4th	40 mph

Shifting at the minimum points (20, 32 and 40 mph) puts strain from lugging at a very minor level, while producing the greatest gasoline mileage.

Now to your family. Most small engines such as yours start sounding like they are coming apart about halfway into their rpm range. This is probably what your wife and kids are complaining about. Needless to say, this is far above the lugging speed of the engine. However, if the car is bucking, you're well down into the lugging range. Seek that point just above the lugging range and shift there. That way you'll keep everybody happy.

It's a bad idea to shift down into lower gears before stop signs. Such shifting puts unnecessary wear on the clutch, gears and engine. Use the brakes instead. After all, $21.95 for new brake pads is far cheaper than a new transmission, clutch and engine.

The only reason to shift down gears is to get more acceleration power from the lower gear. If you're going to stop, why bother?

And anticipating a further question: Yes, the car with the shifting points listed does exist and I get 30 mpg with it.

When stationed in south central Texas I tried a major brand synthetic oil in my motorcycle. It seemed okay until the engine reached normal operating temperature. Then my oil pressure gauge showed a 20 psi drop compared against the oil I had in it previously. Since the engine and transmission use the same oil, I noticed a bad effect on the transmission also. Shifting became hard and rough. After one day of this, I dumped the junk out. It came out as thin as water. I put regular old major-brand 20-50 back in the engine and everything was back to normal. Oil pressure was back up, shifting easy and smooth. Never again will I put that junk back in my engine that sells for $2 or $3 a quart.

While you didn't ask a question, your strong words against synthetic oils require some comments.

Lumping all synthetic oils together is becoming a problem because there are so many with varying viscosities. If you were using a 20W-50 and then changed to a 5W-20 synthetic, you bet the pressure dropped. Anytime you drop that much in weight, the pressure is going to decrease. However, since synthetics cling so tenaciously to moving engine parts, pressure is not quite so critical.

Most motorcyclists who like synthetic oil do so because they find it reduces operating temperatures.

Manufacturers warn against using "super oils" in cycles with common transmission and clutch oil supplies. Need I say more?

By the way, how did you mount your oil pressure gauge? All I've ever seen on a bike is an idiot light.

Double Tech

With TSgt RON LATHROP

I read DRIVER's "How It Happens" in the January 1980 issue, in which the advice was to pump the brakes in order to pull out of a skid on a slush-covered road. I have read in *Aerospace Safety* that it's not a good idea to pump the brakes, that this will make the skid worse. Who's right?

That depends on whether you are driving a car or flying an airplane.

Normally with a car you build up speed until you start hydroplaning. This can happen on takeoff with an aircraft, yet there is still a big difference.

With the aircraft, thrust—not transmitted via the wheels—is pushing the bird toward liftoff speed. Even if the tires start hydroplaning, the craft will still continue to accelerate. This can be a problem for the pilot if a skid develops or should the takeoff be aborted.

Back to the car. Its thrust toward hydroplaning speed is developed by the wheels. Once the vehicle reaches hydroplaning speeds, the tires are no longer getting traction with the surface. At that point acceleration dwindles. Therefore the car's speed will always be hovering near the hydroplaning speed—not significantly higher than the hydroplaning speed as with landing aircraft.

Of course, it is possible to drive a car very suddenly onto a surface that produces hydroplaning and be in the same situation as the landing pilot. Possible, but very unlikely.

Therefore we have two separate situations. One in which the vehicle is hovering just above hydroplaning speed; the other where the vehicle is traveling much faster than hydroplaning speed. In the first situation, as soon as the vehicle slows it will regain traction. In the second, there is going to be a long breath-holding pucker factor to endure.

To quote *Aerospace Safety's* hydroplaning article, "The best braking technique is to apply a smooth and steady pressure trying to maximize the braking forces without locking the wheels and inducing a skid."

Here's where DRIVER writers ran into a rub. It seems that there are two definitions of "pumping the brakes." For many people this means hitting the pedal hard, letting off; hitting it hard, letting off; etc. At DRIVER, "pumping" refers to applying just enough pressure to see if there is any braking action and then backing off it there isn't. Then trying it again.

This same action happens with the smooth and steady pressure referred to by *Aerospace Safety*. Because if the brakes lock, they have to be released—thus the "pumping action.

Remember, the car is usually going only slightly faster than hydroplaning speed. Therefore, using DRIVER's "pumping," the vehicle operator will know when he has slowed to less than hydroplaning speed and will be able to slow the car even more. Pilots get a more exciting ride.

To summarize: If you are skidding at a speed well above hydroplaning speed, any braking action is only going to make matters worse. If you are skidding at a speed near hydroplaning speed and you pump the brakes hard, things will get worse. If you are pumping the brakes just enough to tell when the wheels regain traction, you'll have a better idea of when you are in command of the situation instead of just being along for the ride.

The bottom line is: that "How It Happens" could have had a much longer answer. The other DRIVER editors and I should have been more comfortable with our response before printing. Maybe you'll find this partial reply more to your liking:

He should have been traveling slower in those conditions.

If he thought he might be hydroplaning, he should not have attempted to change lanes. He should have eased off the gas and lightly pumped the brakes to see if he had any traction.

He should have never attempted to use the median in the first place. Having gone on to the next exit, he could have notified authorities and let them check the situation out, or gone back to the exit before that and turned around again to get to the other vehicle.

Apparently he whipped the steering wheel around into the skid (or maybe he just let go of the wheel, letting the car's self-tracking action guide the front wheels) which resulted in overcorrecting the one skid and causing another skid in the other direction. If he had just steered into the skid calmly, the car still might have slid in the opposite direction, but not so much that he would not have been able to correct for that slide, also.

And then along comes the light pumping of the brakes. OK, we agree that hard pumping would have sent the car spinning down the highway like a top, right?

Remember, he does only one thing at a time. In this case, the skid begins, he corrects the wheel to steer into the skid. Even though the car is still skidding, he begins to ease his foot off the gas pedal. If the car starts skidding more, he adds more steering correction while holding his foot position on the gas pedal.

Once he has his foot completely off the gas pedal and the skid isn't getting worse, then he can begin to feel-pump the brakes to see if the car can get any traction to use in scrubbing off enough speed so that he can regain full control.

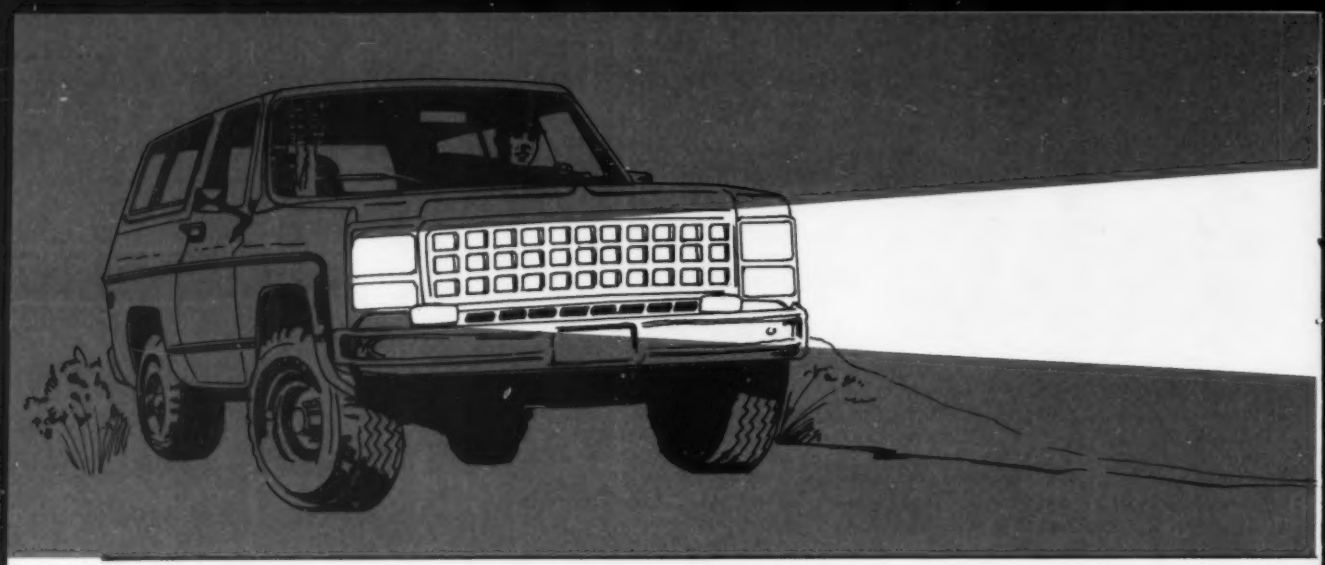
Likewise, following his original overcorrecting and the resulting counterspin, when the time arrives he could have been pumping the brakes to know for sure when he got more solid footing and, maybe, not gone that far down the bank.

In general, drivers tend to react too violently during emergencies by whipping steering wheels about and stomping on pedals. A lighter, smoother touch will usually keep the driver from complicating an already bad situation.

Editor's note: Double Tech is a question and answer column in which DRIVER Magazine Technical Editor, TSgt Ron Lathrop, attempts to clear up some cloudy issues in readers' minds. Unlike other motoring publication Q&A columns, Double Tech doesn't deal with specific questions such as, "Why is my 19-liter, 9,000-pound Potawatomiemobile only getting 2.34 miles per gallon?" Instead Double Tech fields questions that are of general interest to the majority of DRIVER's readers. Nevertheless, when sending questions to Double Tech be sure to include all available information because this will help in finding the correct solution. If you have a question you'd like an answer to, and you feel others could use the knowledge also, send it to:

Double Tech
DRIVER Magazine
HQ AFISC/SEDD
Norton AFB, CA 92409

DRIVER is like other magazines in that there is a long time between writing, publication and mailing, so don't be surprised if it takes more than 90 days to see a reply in print.



How fast is too fast? If your answer is "faster than the posted speed limit," you're partially correct. When the road is dry, the visibility good (read, good during daylight hours) and the traffic spread good, the posted speed limit is fine. But anything that limits these optimum conditions lowers the maximum safe speed, no matter what the signs say.

Too fast is when the vehicle is no longer under the driver's complete and absolute control. Daytime factors which affect that control include: vehicle condition, brakes, tires and handling qualities, the driver's skill, and the driver's physical abilities. How far and how much can be seen become factors after dark or in poor weather.

A vehicle and driver combination that may be safe well above any posted speed limit under optimum conditions can become totally unsafe at 45 mph during nighttime or stormy weather because the ability to control the vehicle is limited by the range of vision. And this range is determined by the vehicle lighting system.

Automobile headlights are compromises. While the light output is good, little of it goes where it's needed. Poor installation and soft suspensions contribute to extreme angle changes and the light isn't always where you want it. Therefore, drivers who must travel over varied terrains in all types of weather, day or night, depend on auxiliary lighting.

Just hanging gobs of candlepower on the front of the vehicle won't get the job done. Unless, of course, the job happens to be illuminating a night ball game, or landing in jail for hitting the wrong person in the eyes.

Candlepower is relative and meaningless for three reasons. First, it is measured in the laboratory, not in the environment. Factors that affect the environment include quality of installation, mounting height, aiming, atmospheric conditions, temperature fluctuations and voltage variations. Besides, there are numerous ways to measure candlepower (cd). Secondly, even if cd measurement were constant, it wouldn't reflect the lamp's performance on your vehicle. Finally, cd represents only a single spot on the beam (the hot spot), ignoring optics and distribution of the light pattern. After all, how much could you see with a laser?

If bigger isn't better, what is important in light selection? Distribution, balance and usable illumination are the important factors. Is there a single measure of these qualities? Yes, like it or not, price is the best measure. The cost/effectiveness ratio of auxiliary lights is virtually linear. You get what you pay for.

Auxiliary lights are much like the halogens discussed in the February 1980 DRIVER. The quartz globe is filled with one of the inert halogen gasses (originally it was iodine, but today's lights use bromine). Burned tungsten particles are redeposited on the filament instead of the globe, preventing darkening as the lamp gets older. They also tolerate vibrations well. The color light given off is a bluish-white of 3200 to 3600 degrees Kelvin, instead of the dingy yellow of standard sealed beam headlights.

The type of lamp is determined by the lens. Flutings molded on inner surfaces of the lens bend the light into the beam shape that makes a driving light a driving light and a fog light a fog light. It is this advanced degree of optical refinement in a lens that makes an auxiliary system costly. Some lens prisms require as many as 22 different cuts to form. Consequently, if a lamp has louvers or shutters on the outside, don't buy it; they mean the lamps's optics need help.

The lens of a top-quality lamp is not made of glass because glass is not 100 percent transparent. Although there is always some degree of reflection or refraction, lead crystal is best and so is used even though it costs more.

The lamp reflector is basically a light-intensity amplifier. And putting another rumor to rest, today's technology results in rectangular lamps that perform equally as well as round ones. Premium reflectors are manufactured to exacting standards from metal (not glass) to conform to a true parabolic slope. This allows the light to be reflected in parallel lines provided the light source is at the focal point.

auxiliary LIGHTS

Your actual lamp selection will depend upon the terrain and weather in your environment. For example, lights that would be excellent for the desert or open country would be downright dangerous in mountains, wooded areas or on narrow, winding country roads. However, aiming has as much to do with a lamp's functioning as design does. A lamp for open roads is aimed for range at the expense of side light. Using this same aim on a winding road would mean that everything but the road would be lighted. Changing the aim would actually allow the secondary lighting to lead the car around the bends.

With dismal, dreary weather, candlepower can be a real hazard. In rain or fog any stray light that doesn't head exactly where needed will reflect off moisture drops, making things opaque and dazzling the driver. In such conditions a flat-topped beam is required to undercut fog and rain.

What you're looking for is panoramic visibility in all situations; on long straights; during cornering; in dust, fog, rain and snow; or while backing up. (Hope you hadn't forgotten you have to be able to see while backing up, too.)

Start with the headlights (see "Halogens Are Here" and "The Backyard Mechanic" in the February 1980 DRIVER). A quality set of headlights that are conservatively aimed work best. Conservative aiming lights the curb and ditch yet focuses high enough to provide adequate down road illumination with courtesy to oncoming vehicles.

For those of you outside the United States, European-code headlamps can also double as fog lights. Their excellent cut-off allows little stray light upward.

To provide totally panoramic visibility, the headlights would be supplemented by a pair of long-range driving lights and a pair of fog lights. However, before dashing out to purchase such a set, look at the types of lights available versus the job to be done.

Pencil and spot lights are about the same; an intense, narrow conical-shaped pattern used for long-range, high-speed, straight motoring. Driving lights, on the other hand, are also long-range, but have a bit broader oval beam to provide more fill than pencil/spot lamps with slightly less range.

The double-fan is a driving lamp that has more width immediately in front of the vehicle.

Fog lights are flat-topped beams. With fog lights there is always going to be the argument about yellow or amber lenses versus clear or white. Amber light affects the physiology of the eye, improving depth perception and reducing eye strain. However, clear lenses provide 15 to 20 percent more light output, while the amber light tends to reflect from solid objects and the road itself. An interesting note here is that clear fog lights also make excellent backup lights.

Unless you're crossing a desert, spot beams are unnecessary except as part of a two-or three-light combo. They might also be used to momentarily or intermittently pick up highway signs. Other than that, all spot beams do is light up trees, fields and houses.

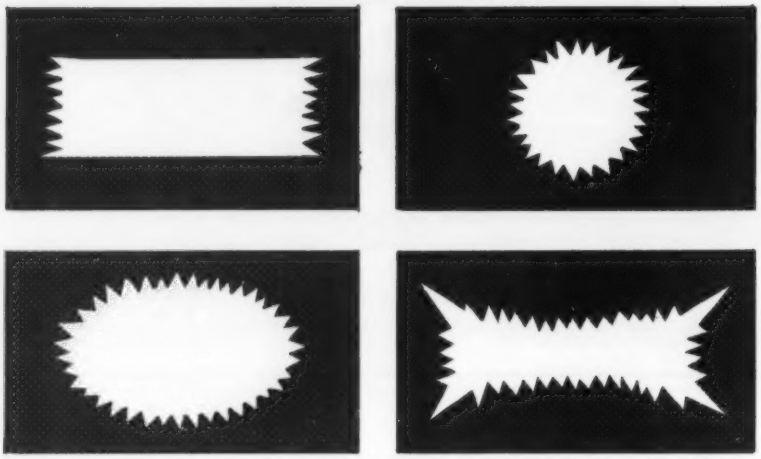
A good combination, especially in New England, is two fans. Variations of this combination include one spot and one fan or one fan and one fog.

The single spot/fan combination is good when the spot is mounted on the ditch side of the vehicle and aimed straight ahead to pick up stray animals before they begin to cross the road. The fan is then aimed slightly to the right while being focused between the highbeam hot-spot and the car, but just beyond the low beam cut-off.

With the twin fan set of lamps there are several ways to aim. One is straight ahead, allowing the fan portion to fill the sides as well as the area between the high and low beams. Angling the lights slightly more outward produces a wider side light with less range. This is excellent for reading road signs and is fair in fog. Angling slightly inward provides more range with closer side light, tending to light the way for corners.

On the West Coast it might be a good idea to carry spare lenses. Use a spot for the desert and then change to fans for the mountain and coastal roads.

continued



Shine auxiliary lights on a wall and the patterns will look like this for the (clockwise from top left) fog light, spot driving light, fan driving light and oval driving light. Note how the flat cutoff of the fog light prevents glare from fog, rain, snow or dust from reflecting back into the driver's eyes.

But NEVER use accessory lights in town!

When most people think of mounting restrictions they think of the limited space at the front of the vehicle. While it's true this is critical, don't forget there are also electrical restrictions. Most 55-watt accessory lights draw 4.2 amps at 13.2 volts. Now add to this drain on the electrical system the amps required to run the wipers, fuel pumps, blowers (heater and defroster) plus the current requirements for all other accessories that could be operated together at one time. To this figure add 25 percent. The alternator must match or exceed the total. If it doesn't, the system requirements are going to have to be reduced, or a larger alternator installed.

A word about 100-watt bulbs. While the 55-watt units can easily be replaced with the 100-watt bulbs for a 40 to 60 percent output increase at a drain of 7.6 amps each, there is no need for this much light on any road vehicle.

Back to the headlights. Check the nylon nuts; if they're stripped the headlights will pop out of alignment faster than the guy behind you can honk his horn when the light changes green.

When mounting the accessory lamps, don't block radiator air flow or obscure beams from other lights. Mount driving lights as high as possible. Fog lamps should be below eye level. However, if you get them too low you're just liable to take them off on the first curb, or stones will take them out.

Until recently bumpers have lacked the rigidity necessary for mounting lights. If there is any question that beam bounce might result, construct a light bar for the auxiliary lamps. Angular aluminum about $^{5}/_{16}$-inch thick does the trick nicely. Some of the light companies make stabilizer struts for their lamps that also help with adjusments.

If the accessory light's housing is going to reflect light from another lamp, paint it flat black.

If traveling the back roads or offroad is going to be common, the purchase of coarse screen grilles for all the lights should be considered. Clear plexiglass shields can also be purchased or constructed, but you will lose almost 10 percent of the light output. Lexan or similar polycarbonates are stronger, but even less transparent. Usually $^{3}/_{16}$-inch stock works best.

Please, use a little common sense: disconnect the battery before beginning wiring.

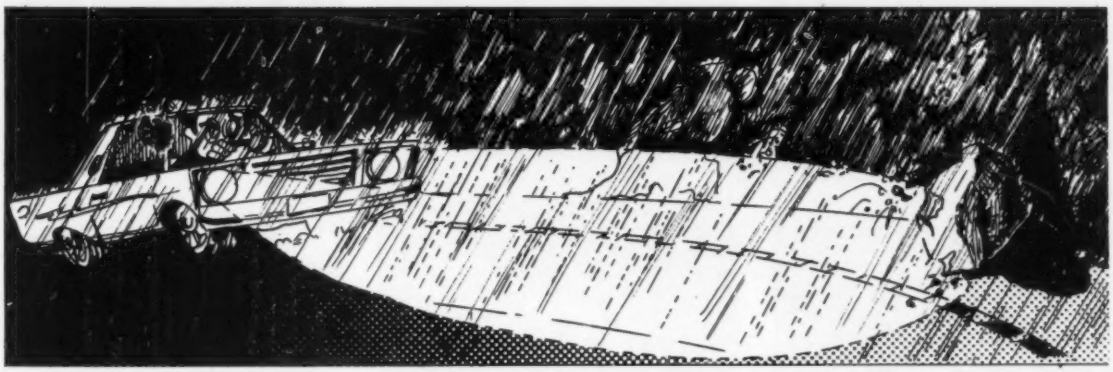
For wiring, usually 14-gauge, multistrand wire is best. Solid core wire is inflexible and prone to break, while 12-gauge wiring is an overkill. The main power supply from the battery should be 10 gauge cable.

Wires should be cut to the exact length required. Not only does long wiring look sloppy, but it also offers more resistance so there is less voltage at the bulb, reducing the output. Long wires also vibrate, rub against everything and get caught where they shouldn't.

Keep all wires away from sharp edges, heat, gasoline, oil and water. A lot of problems can be prevented by routing wires in clear plastic (surgical) tubing which also prevents pinching. Use nylon cable ties for attaching enroute to prevent chaffing.

It's a good idea to run the wiring for the right side lights down the right side of the vehicle, the left lights down the left side. Additionally, by color coding all switches, wires and other components, you'll find it easier to trace problems later. And don't hide the wiring; you may need to locate it someday.

Connections should be clean and solid. Solder all joints including all non-insulated crimp-ons. And use a crimp tool, don't just pinch the solderless terminals with pliers. Don't solder



or bolt two small wires to a larger one. Feed the smaller wires through a multiple plate terminal strip.

All exposed terminals should have heat-shrink insulation. Yes, silicone sealants work exceptionally well.

The grounding of each lamp is just as important as the hot lead. Since the lamp is grounded through the mounting bolt it may be necessary to run an auxiliary ground strap from the mounting bolt to the body or chassis. This is especially true with the aluminum bracket or when the lamps are hung on aluminum bumpers.

Fuse each lamp separately. If there are enough blanks on the main fuse block, it is the best place. Or install your own fuse block, but keep it protected from dirt and water. Inline fuses also work nicely. Of course the class way to go would be to install manual reset circuit breakers. Check with an aircraft parts store for these.

As for light switches, cheap is no bargain. Get ones that are rated for twice the current requirement needed. Hold out for all metal units. Never run more than two lights off one switch, with one lamp per switch being the best. Keep switches as close together as possible so they can all be thrown off at once. Also arrange the switches according to the side of the vehicle they control. This one-side operation is excellent for extreme conditions such as blowing snow or dust. Placing varied lengths of rubber hose over the end of each switch makes switch identification easier in the dark.

One indicator light per switch always makes life easier. If this proves to be too bright, paint the lenses black except for a small hole in the end or a slot just large enough to illuminate the labels. The indicator light color code should match the wiring color code.

Relays are electromagnetic switches that absorb power surges and minimize resistance. Because they provide direct battery input into the lamps, relays should be installed as near the lamps as possible keeping the power wires short. Mount relays with the terminals down and in the best position to keep dirt and water out. Don't run more than two lamps off a single relay and color-code the relays to match the wiring.

Most relays have four terminals. One to the battery, with the second terminal doubling as the mount and ground. The third terminal is the triggering contact while the fourth goes to the lights.

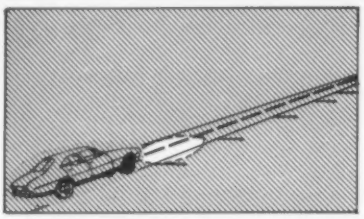
There are several systems of wiring through the relay. One would trigger the accessory lights off the high beam wire. Another system would kill all the auxiliary lights when the low beams were on. Yet another system of wiring would kill all the auxiliary lights when the fogs were on, or vice versa.

Lighting performance is a lot more than the sheer weight of candlepower. Useable illumination is the result of all the lamp components as well as mounting and wiring working together. An imperfection in the lens or reflector can block or scatter the light. Errors in mounting, aiming and wiring can greatly reduce visibility and increase glare.

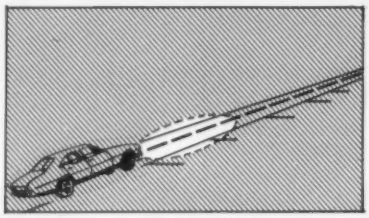
Unless accessory lights on your vehicle are strictly cosmetic, plan, buy and install the system with precision.

continued

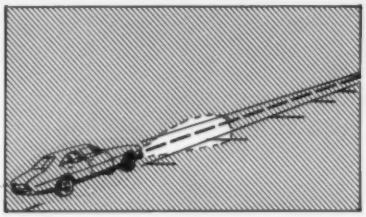
continued



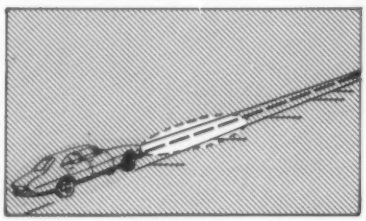
The normal pattern for sealed beams on low looks like this, reaching about 950 feet with dual units (7-inch round or 200mm rectangular) and 800 feet with quad headlamps (5¾-inch round or 165mm rectangular).



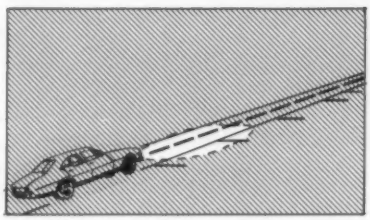
On high, the pattern of dual sealed beams looks like this reaching about 1,250 feet.



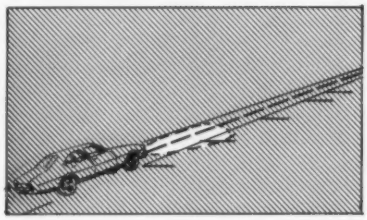
Quad sealed beams on high project a pattern like this about 1,250 feet.



Sealed halogen headlights have a pattern like this that may reach 1,875 feet.



The normal European low beam pattern resembles this. The range of this pattern is about 950 feet for the quad round headlights, 1,050 feet for the quad rectangles, and as much as 1,200 feet for the dual round headlights.



Dual European high beams project this type pattern between 4,750 feet and 5,600 feet, depending on whether the lamp is round or rectangular.

Yes, but is it legal?

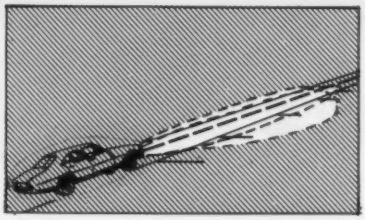
Regard the following as a guide only. Interpretation of codes is often left to local authorities, and several states have changes pending. Almost all states require manufacturers of auxiliary lights to obtain approval of their products from the motor vehicle department prior to marketing. Consult local department of motor vehicles or similar authority before fitting any type of auxiliary lighting units to your vehicle.

Non-sealed beam headlights of any kind, halogen or otherwise, are illegal in the United States.

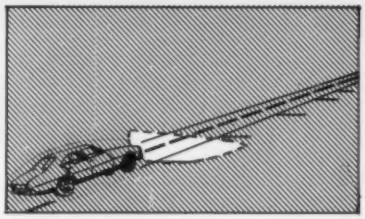
Driving lights are legal in most states if mounted according to local regulations. At last count there were 32 states with regulations covering height from the ground to the center of the lamp and a limit on the number of driving lights. In no case covered by regulation were driving lights to be higher than 42 inches above the ground. Two lights not less than 12 inches above the ground prevail in 13 states. States with a minimum height regulation of 16 inches numbered 14, nine allowing two lights while the remaining five allowed only a single unit. Four states place the minimum height a driving light may be at 24 inches above ground; three allowing two units while the remaining state again limited vehicles to a single driving light. One state had a regulated 20-inch minimum height for two lights.

Fog lights, clear and amber, are legal in all 50 states. However, 34 states allow a maximum of two fog lights to be mounted 12 to 30 inches above the ground. These states further state that the light beam from the fog lights (measured 25 feet in front of and to the left of the vehicle's center) must not be above a point four inches below the center of the lamp.

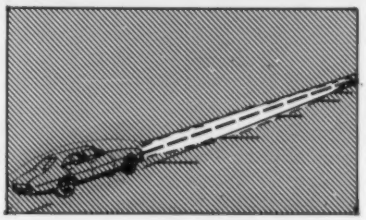
As DRIVER has said in the past, when it comes to vehicle lighting, check with local authorities.



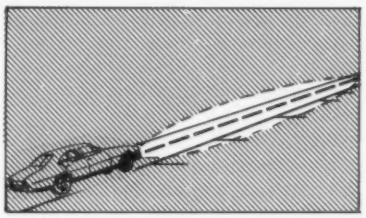
Quad European high beams project a double pattern similar to this. The outer, wider and shorter pattern from the H4 bulbs reaches from 3,250 to 3,400 feet depending on whether it is projected by a rectangular or round lamp. The far-reaching H1 bulbs send light 5,500 feet from rectangular lamps or 8,600 feet from round ones.



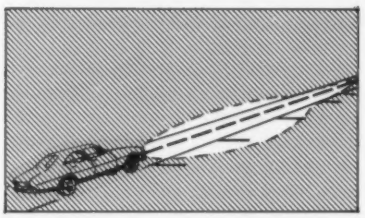
Fog lights not only provide an excellent upward cutoff but spread almost 180 degrees in front of the vehicle for good side vision. This pattern can reach from 375 to 700 feet depending on how expensive the units are.



The extremely long range, penetrating light of a pencil or spot beam driving lamp is for high speed motoring only. Inexpensive spot beams *may* only reach about 4,400 feet while the best units provide illumination 9,500 feet down the road.



Oval pattern driving lights provide additional forward and lateral illumination for open-road motoring where there is no opposing traffic. The price paid for the unit can bring a range from 5,000 to 6,000 feet.



The fan or bow-tie light provides more beam width immediately in front of the vehicle at the expense of some distance. Ranges vary from 3,700 to 5,000 feet.

Aiming to please

The installation and aiming of headlights was discussed in detail by the Backyard Mechanic in the February 1980 DRIVER. However, for a quick review, the following information is provided.

When aiming any lights, make sure the vehicle is parked on level ground with at least half-a-tank of fuel and the normal driver/passenger load. If a vacation is at hand, or a trailer to be towed, add the correct weight in the proper places before aiming the lights.

Aiming measurements provided are for ideal light use and not necessarily legal everywhere. Check with local authorities first.

Measure sealed beams 25 feet in front of the vehicle. On high, the light pattern should be at the same vertical height as the headlight centers and at the same horizontal distance between headlights divided equally by the vehicle's centerline.

For people outside the United States aiming non-sealed beam headlights, here are some ball park figures. For H4 headlights (the seven-inch round or 200mm rectangle units) aim the low beam ½-degree down and straight ahead. The high beam will follow. Quad-light systems usually have H4 units on the outside. The inside, H1 highbeams should be aimed parallel to the ground and straight ahead.

Driving lights used for long range should be aimed parallel to the ground and straight ahead. Driving lights to be used for cornering can either be aimed parallel to the ground and three to five degrees left and right for the left and right lamp, respectively, or with the lights crossed 10 to 20 degrees.

Fog lights used for foul weather are aimed ½ degree down and zero to three degrees left and right. Fogs used for cornering are aimed parallel and five to 10 degrees left and right.

Again, the aiming measurements provided here are for ideal light use and not necessarily legal. Check with local authorities.

DRIVER

THE
TRAFFIC SAFETY MAGAZINE
FOR THE MILITARY DRIVER

DEPARTMENT OF THE AIR FORCE
HQ AIR FORCE INSPECTION AND SAFETY CENTER
Norton Air Force Base, California 92409

HON HANS M. MARK
Secretary of the Air Force

Lt Gen HOWARD W. LEAF
The Inspector General, USAF

Maj Gen LEN C. RUSSELL
Commander
Air Force Inspection and Safety Center

Col LELAND K. LUKENS
Director
Aerospace Safety USAF

PUBLISHED MONTHLY IN COOPERATION
WITH
THE DEPARTMENT OF THE ARMY
AND
THE DEPARTMENT OF THE NAVY

Dr. FRANCIS S. McGLADE
Director of Safety
United States Army

RADM W. B. WARWICK
Commander
Naval Safety Center

AFRP 127-1
Controlled circulation entered
at Santa Ana, CA USPS 448-630

Authority to publish this periodical automatically expires on 29 January 1982 unless its continuance is authorized by the approving authority prior to that date.

SUBSCRIPTION—DRIVER is available on subscription for $12.00 per year domestic ($1.00 per copy); $15.00 per year for foreign mailing ($1.25 per copy), through the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Back issues are not available. Changes in subscription mailings should be sent to the above address. Use of funds for printing this publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. No payment can be made for manuscripts submitted for publication. Contributions are welcomed, as are comments and criticism. Address all correspondence to the Editor, DRIVER Magazine, HQ AFISC/SEDD, Norton AFB, CA 92409.

Distribution. One copy for every 9 members of USAF.

ATTENTION DEPT OF THE NAVY PERSONNEL: Address all queries concerning distribution to NAVSAFECEN, NAS, NORFOLK, VA 23511, Attn: Safety Publications Dept. All other correspondence will be welcomed by the Editor.

The contents of this magazine are informative and should not be construed as regulations, technical orders, or directives unless stated. Address reprint requests, stating intended use of material, to the Editor. The Editor reserves the right to make any editorial changes in manuscripts which will improve the material without altering the intended meaning.

The inclusion of names of any specific commercial product, commodity, or service in this publication is for information purposes only and does not imply endorsement by the Air Force.

Certain individuals shown in this magazine are not members of the Air Force and therefore do not conform to Air Force grooming standards.

LETTERS to the EDITOR BACKfire

LIFESAVER BANNER

While reading the February 1980 issue of DRIVER I believe you have entered an article which is misleading to your readers.

Inside the cover page you have a picture of a lady and her child standing beside a disabled vehicle with a lifesaver banner which attaches to the vehicle.

You refer the reader to GSA special item number NIS G-4821. As both the woman and the vehicle are civilian this gives the impression that you can obtain the item from GSA for personal use. As you know you may not requisition material from GSA or any other government source for personal use. Would you please inform your readers of this?

In the future I would suggest that any articles which are produced from a government source have a military person and government vehicle pictured. If not, you should list a commercial source with the GSA reference. Let's preclude "white collar" theft.

AKCS David M. Miller, USN
NAMTGD Box 118
NAS Cecil Field, FL 33215

Thanks, David. We never looked at it that way. Incidentally, we have had many inquiries about the Lifesaver banner. The commercial source is Lifesaver Industries, 6210 Wilshire Blvd., Los Angeles, CA 90048.

WRONG-WAY BICYCLING

Like Mike Cline (Mar '80 "Backfire"), I have strong feelings on the subject of bicycle riding, especially wrong-way bicycle riding.

It just doesn't make sense to run the risk of a head-on collision with either another cyclist or an automobile. That's the chance a wrong-way rider takes when pedaling against traffic.

I ride my 10-speed bicycle to and from work along a four-lane expressway near Travis Air Force Base. Although motorized traffic clips along at freeway speeds, I pose no conflict to other drivers because I react predictably, and I follow the time-honored rules of the road. I ride with traffic, as far right as practical.

In fact, the history of bicycles using 1000 miles of freeway shoulders in the state of California reveals a sparkling safety record – less than 10 bicycle accidents on freeway shoulders since they were opened to cyclists over four years ago.

Accidents don't happen just because slower vehicles occupy a lane next to a faster flow of vehicles. Bicycling accidents happen because cyclists break the law. In California, wrong-way riding and failure to yield are the leading factors in bicycle-caused accidents. That's because the closing speeds are greater when riding against traffic and because motorists are more likely to swerve suddenly when confronting a cyclist riding against the flow.

Bicycles belong in the traffic mix. And bicycle riders owe it to themselves to safely follow the rules of the road.

Mr. Bernard F. Goldbach
Director, Commuters By Cycle
2834 Calaveras Drive
Fairfield, CA 94533

HAIRY PROBLEM

Re your April '80 issue: If the young off-duty airman pictured on page 8 isn't on his way to the barbershop, he should be. Either that or AFR 35-10 doesn't apply to airmen at Norton maybe?

CMS William G. Patterson, USAF
HQ PACAF/DPHSD
Hickam AFB, HI 96853

Yes, AFR 35-10 applies to personnel here, too. Paragraph 1-12b states: "Air Force personnel must comply with these standards while in uniform and while wearing civilian clothing on duty." The

airman pictured on page 8 of the April '80 DRIVER does comply with the hair standards when groomed to perform his military duties.

BELT AND POSITIONS

I enjoyed your lighthearted article on driving positions (April '80 DRIVER).

You missed one very important part of the proper position for driving or riding in an automobile – safety belts. None of your pictures or discussions bothered to make mention of the importance of their proper use.

Mr. Kevin H. Kruke
Transportation Economist
Highway Users Federation
1776 Massachusetts Ave., N.W.
Washington, D.C. 20036

The focus of that article was on the positions themselves, not seatbelts. We hope you realize these photos were all staged. The people were all supposed to be bad drivers, who of course don't wear belts. In reality we don't know any of that kind of people.

CAPTION CONTEST

How is this for an appropriate caption for your "Attention, amateur humorists!" section in the January '80 issue: "This is the last time I take a Rec Center Budget Special tour!"

Sad to say, this really happened to me. A bus I was on ran out of gas on a Sunday afternoon and came to a stop on railroad tracks. Here in Germany railroad tracks do get used frequently. Fortunately there was a gas station open about 200 yards away and we managed to push the bus to it.

Keep up the excellent work on the magazine. I really look forward to reading it every month.

SSgt Karin S. Jones, USAF
7102 CPUSS Box 7488
APO New York 09012

The winners of our humor contest are listed to the right.

HUMOR

You readers remember this photo, from our "Humor Contest" in last January's issue. In response to our challenge to write a funny caption for the picture, we got 270 lines from you people, which is a good return.

Our independent panel of judges (one virus-laden NCO and one hair-laden civil servant) picked the winners on the basis of what they thought was original and funny.

This was our winner:

"Man, these potholes get worse every year."

Sgt Jerry R. Knight
Stars and Stripes
APO New York 09211

Here are a few others we liked:

"Frankly, until now I had never given much thought to how much a bus weighs."

TSgt Charles L. Bales
Robins AFB, GA

"Alright, who's the wise guy who shouted 'Hold the bus'?"

2d Lt Ed Boring
Barksdale AFB, LA

"When parking on an incline, always use the emergency brake."

Maj Bill Crimmel
Seabrook, TX

"It could be worse, Ethel. We could have taken a train."

CTR1 Barry E. Cedar
CTR3 Robert C. Davidson
CTT1 Robert W. Muhl
USS William H. Standley

"If this thing slips back, we're going to make one heck of a bumper sticker."

Sgt James L. Kerns, Jr.
Grissom AFB, IN

You may not agree with our judgment on humor, but we think you'll have to agree on the originality part.

Which brings up another item: 11 percent of the responses we got were variations on the old Greyhound theme "And leave the driving to us." It's not very original, of course, but with that many responses, we had to come up with a winner for that theme.

So, for "Best performance by a joke writer using the theme 'And leave the driving to us' ":

"When they said, 'Leave the driving to us,' I had no idea they'd leave the energy to me!"

AZ1 G. R. Dobbs
Glenview, IL

Another 10 percent of our captions were variations on the "no frills/economy fare" theme. So, here's our winner in that category:

"No wonder it was only $8.99 from Boston to L.A."

Brian Marie
Bremerton, WA

Nita Curley of Edgemont, Cal., gave us a chuckle with her letter. Her line was another of the "Greyhound" captions, but she closed with "Sincerely yours, (If this is original) Oh, rats! (If it isn't)."

You winners will be receiving your special DRIVER pen and pencil sets soon.

☆U.S. GOVERNMENT PRINTING OFFICE: 1980—683-215/9

OLD CHIEF COLE

Old Chief Cole was a cautious old soul
And a cautious old soul was he.

He locked up his car and he went for a stroll
and remembered to pocket the key.

AUTOS GO "BEEP!"

Autos go "Beep!" and try to creep
'Round my car, stalled on the highway.

I'll leave it alone and find a phone;
A tow truck'll haul it away.

LITTLE MAC HORNER

Little Mac Horner drove to the corner
Shopping for butter and bread.

'Twas less than a mile, but he said
with a smile
"Walk? Why, I'd rather be dead!"

WAA, WAA, HOT RODDER!

"Waa, waa, hot rodder! Use you any fuel?"

"Yes, sir; yes, sir; three tanks-full.
One in the evening, two in the day.
It's just because I drive so fast—
I burn it all away!"

MARY HAD A LITTLE VAN

Mary had a little van; the exhaust was dark with smoke.
And everywhere that Mary drove,

the folks began to choke.
She drove it into town one day; it nearly gassed a crowd.
The cops gave her a ticket for the noxious smoggy cloud.

LITTLE BOY IN BLUE

Little Boy in Blue, don't blow your horn;

The traffic is snarled and tempers are worn.
It won't do much good to carry a grudge;
You'll just have to wait for those cars to budge.

DRIVER-Rhymes . . . or